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APPLICATION NO.	FILING DATE	FIRST NAME INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/987,660	11/15/2001	Yasushi Iyechika	2185-0589P-SP	7521

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EXAMINER

TRAN, LONG K

ART UNIT	PAPER NUMBER
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2818

DATE MAILED: 03/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/987.660

Applicant(s)

IYECHIKA ET AL.

Examiner

Long K. Tran

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 January 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Foreign Priority Application (PTO-152)
3. ☐ Notice of Foreign Priority Application (PTO-152)
4. ☐ Interview Summary (PTO-413) Paper No. _____

Information Disclosure Statement

1. This office acknowledges of the following items from the Applicant:

Information Disclosure Statements (IDS) filed on September 12, 2002 and on September 24, 2002 in Paper Nos. **7** and **8**. The references cited on the PTOL 1449 form have been considered.

Specification

2. Change all "3-5" to -- III-V --. Appropriate correction is required.

Claim Objections

3. Claims 1 – 8 are objected to because of the following informalities: Change all "3-5" to -- III-V --. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 9 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. "A single layer contains the n-type

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1 – 8 are rejected under 35 U.S.C. 102(e) as being anticipated by Iyechika et al. (US Patent No. 6,023,077).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Regarding claim 1, Iyechika et al. disclose a III-V group compound semiconductor represented by the general formula $\text{In}_x\text{Ga}_y\text{Al}_z\text{N}$ ($x+y+z=1$, $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$) in which the concentration of a p-type dopant is $1 \times 10^{18} \text{ cm}^{-3}$ or more and $1 \times 10^{19} \text{ cm}^{-3}$ or less. See

entire document especially **col. 2, lines 44+; col. 5, lines 17 – 19; col. 8, lines 1 – 14;**

Cols. 11 – 14.

Regarding claim 2, Iyechika et al. disclose a III-V group compound semiconductor having a structure in which a layer 5 (figs. 1,3-4) composed of a III-V group compound semiconductor represented by the general formula $\text{In}_u\text{Ga}_v\text{Al}_w\text{N}$ ($u+v+w=1$, $0 \leq u \leq 1$, $0 \leq v \leq 1$, $0 \leq w \leq 1$) is adjacent to a layer 6 (figs. 1,3-4) composed of a III-V group compound semiconductor represented by the general formula $\text{In}_x\text{Ga}_y\text{Al}_z\text{N}$ ($x+y+z=1$, $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$) in which the concentration of an n-type carrier is $1 \times 10^{19} \text{ cm}^{-3}$ or less, wherein the concentration of a p-type dopant is $1 \times 10^{17} \text{ cm}^{-3}$ or more and $1 \times 10^{21} \text{ cm}^{-3}$ or less, and the band gap is larger than that of said layer 5. See entire document especially **col. 2, lines 44+; col. 3, lines 44+; col. 5, lines 17 – 19; col.8, lines 1 – 14; col. 10, lines 41 – 56; Cols. 11 – 14.**

Regarding claim 3, Iyechika et al. disclose a III-V group compound semiconductor having a structure in which a layer 6 (figs. 1,3-4) composed of a III-V group compound semiconductor represented by the general formula $\text{In}_x\text{Ga}_y\text{Al}_z\text{N}$ ($x+y+z=1$, $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$) in which the concentration of an n-type carrier is $1 \times 10^{19} \text{ cm}^{-3}$ or less, wherein the concentration of a p-type dopant is $1 \times 10^{17} \text{ cm}^{-3}$ or more and $1 \times 10^{21} \text{ cm}^{-3}$ or less is adjacent to a layer 7 (figs 1,3-4) composed of a p-type II-V group compound semiconductor represented by the general formula $\text{In}_a\text{Ga}_b\text{Al}_c\text{N}$ ($a+b+c=1$, $0 \leq a \leq 1$, $0 \leq b \leq 1$, $0 \leq c \leq 1$). See entire document especially **col. 5, lines 20-27; col.8, lines 1 – 13;**

Regarding claim 4, Iyechika et al. disclose a III-V group compound semiconductor having a structure comprising at least one layer 6 (figs. 1,3-4) composed of a III-V group compound semiconductor represented by the general formula $\text{In}_x\text{Ga}_y\text{Al}_z\text{N}$ ($x+y+z=1$, $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$) in which the concentration of an n-type carrier is $1 \times 10^{19} \text{ cm}^{-3}$ or less, wherein the concentration of a p-type dopant is $1 \times 10^{17} \text{ cm}^{-3}$ or more and $1 \times 10^{21} \text{ cm}^{-3}$ or less, between a layer 5 (figs. 1,3-4) composed of a III-V group compound semiconductor represented by the general formula $\text{In}_u\text{Ga}_v\text{Al}_w\text{N}$ ($u+v+w=1$, $0 \leq u \leq 1$, $0 \leq v \leq 1$, $0 \leq w \leq 1$) and a layer 7 (figs. 1,3-4) composed of a p-type III-V group compound semiconductor represented by the general formula $\text{In}_a\text{Ga}_b\text{Al}_c\text{N}$ ($a+b+c=1$, $0 \leq a \leq 1$, $0 \leq b \leq 1$, $0 \leq c \leq 1$).

Regarding claim 5, Iyechika et al. disclose a III-V group compound semiconductor having a structure comprising a second layer 5 (figs. 1,3-4) composed of a III-V group compound semiconductor represented by the general formula $\text{In}_u\text{Ga}_v\text{Al}_w\text{N}$ ($u+v+w=1$, $0 \leq u \leq 1$, $0 \leq v \leq 1$, $0 \leq w \leq 1$) carrying thereon a laminated layer 4 (figs. 1,3-4) composed of an n-type III-V group compound semiconductor represented by the general formula $\text{In}_p\text{Ga}_q\text{Al}_r\text{N}$ ($p+q+r=1$, $0 \leq u \leq 1$, $0 \leq v \leq 1$, $0 \leq w \leq 1$) having larger band gap than that of layer 5, and at least one layer 6 composed of a III-V group compound semiconductor represented by the general formula $\text{In}_x\text{Ga}_y\text{Al}_z\text{N}$ ($x+y+z=1$, $0 \leq x \leq 1$, $0 \leq y \leq 1$, $0 \leq z \leq 1$) in which the concentration of an n-type carrier is $1 \times 10^{19} \text{ cm}^{-3}$ or less, wherein the concentration of a p-type dopant is $1 \times 10^{17} \text{ cm}^{-3}$ or more and $1 \times 10^{21} \text{ cm}^{-3}$ or less.

semiconductor and a third layer 7 (figs. 1,3-4) composed of a p-type III-V group

regard to the advantages of maintaining the p-type impurity concentration within the inventive range". In column 8, first paragraph, Iyechika et al. discloses the p-type impurity concentration (not more than $1 \times 10^{19} \text{ cm}^{-3}$) is within/same as the inventive range ($1 \times 10^{19} \text{ cm}^{-3}$ or less). Further, it is noted that "the advantages of maintaining the P-type impurity concentration within the inventive range" are not in claimed languages. Applicants also have failed to point out the differences between examiner's cited references and the applicants' claimed inventions. For the above reasons, it is believed that the rejections should be sustained. Feature of an invention not found in the claims can be given no patentable weight in distinguishing the claimed invention over the prior art.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Onomura et al. (US Patent No. 6,067,309) and Sugiura et al. (US Patent No. 6,204,084) disclose a LED comprising a layer(s) similar to Iyechika et al. (US Patent No. 6,023,077).

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within mailed until after the end of the THREE-MONTH shortened statutory period, then the

Art Unit: 2818

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Long K. Tran whose telephone number is 703-305-5482. The examiner can normally be reached on Mon-Thu.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on 703-308-4910. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7466 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-3329.

Long Tran 

March 19, 2003


HOAI HO
PRIMARY EXAMINER